PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 1/00 — A1

(11) International Publication Number: **WO 96/41463**

(43) International Publication Date: 19 December 1996 (19.12.96)

(21) International Application Number: PCT/US96/09811

(22) International Filing Date: 7 June 1996 (07.06.96)

(30) Priority Data:
08/483,202 7 June 1995 (07.06.95) US

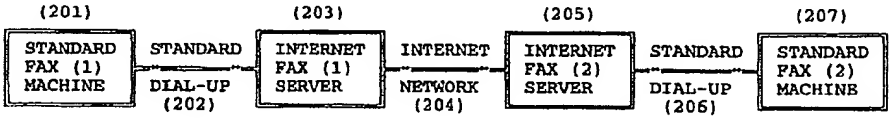
(71)(72) Applicant and Inventor: GESHWIND, David, M. [US/US]; 111 Fourth Avenue, New York, NY 10003 (US).

(74) Agent: STEIN, Mitchell, A.; Stein & Associates, P.C., 805 Third Avenue, New York, NY 10022 (US).

(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: A METHOD FOR UTILIZING POINT-TO-POINT COMMUNICATION DEVICES INCLUDING FAX MACHINES AS BI-DIRECTIONAL INTERNET TERMINALS



System Diagram of FAX to FAX Delivery Via Internet
(Message Flow Left to Right)

(57) Abstract

Devices, such as FAX machines (201, 207), which are intended to communicate with each other over point-to-point dial-up (i.e. telephone) communication networks and, thus, do not affix electronic addresses to their message content, can be made to successfully communicate with addressable electronic mailboxes, such as those common on The Internet, by interfacing with an internet/FAX server (203, 205) which determines an appropriate network address and repackages the communication for a packet-switching communication network. The electronic address can be derived directly from information specified from the transmitting FAX station including: machine-readable graphics (e.g., barcodes or OCR text) embedded within the FAX content, DTMF keypad tones, a digital FAX ID field or new digital information field; or indirectly by table-look-up based on data including: the DID, caller ID, FAX ID field. In particular, when an EMail message is delivered from the internet to a FAX, via such an internet/FAX server, a return coversheet can be provided which will automatically route any return FAX to the original EMail box.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia
AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CS	Czechoslovakia
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakhstan
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam

A METHOD FOR UTILIZING POINT-TO-POINT COMMUNICATION DEVICES INCLUDING FAX MACHINES AS BI-DIRECTIONAL INTERNET TERMINALS

TECHNICAL FIELD

The instant invention relates to a class of methods, techniques and systems for permitting the utilization of point-to-point communication devices, such as FAX machines, as bi-directional internet terminals. This will permit the large installed base of standard (and advanced, computerized, or server) FAX machines to be integrated into "The Internet" (or similar communications networks) as terminals for both information reception and transmission. Inventor refers to such service as "INTERFAX™".

BACKGROUND AND PRIOR ART

There has come to be (in North America specifically and, more generally, worldwide) two distinct electronic communications networks. These may, in fact, share the same physical lines in many cases, but are more clearly distinct based on the type of "terminals" and connection methods utilized.

The first is the familiar "telephone" network — local, long distance, and international. Here the type of "terminals" are primarily simple voice telephones, FAX machines and, occasionally, video- or picture-phones. The characterization of these terminals, and the connection method used, is that the terminals are relatively unintelligent transducers (for voice or image) and are connected point-to-point for what is usually a dedicated and short term "conversation" on a "dial-up" basis. The crucial aspect here is that the information gets to where it is going by virtue of the specific and dedicated nature of the connection. That is, a particular phone/FAX at one location or phone number, is connected to another by creating a point-to-point connection to another particular location or phone number. The information gets to where it is going because that is the only place for the information to go — over the single established connection. It should be noted that pairs of computers may also "converse" over such point-to-point connections via modems; although, unlike the other "terminals" described above, because of their additional capabilities, computers may also communicate over the network type described directly below.

The second type of electronic communication network is a message or packet switching network; the most conspicuous of these being "The Internet".[1] [Throughout this document references made to "The Internet" or "internet" may be considered to apply to any similar data network. Similarly, throughout this document references made to internet or EMail accounts may be considered to apply to any similar account, location or "mail-box" even if not strictly on The Internet, for example: accounts located at on-line services such as America On Line or Compuserve; accounts on bulletin board services; or accounts on large computer systems at universities, laboratories, military or government agencies, or businesses.] The difference is that messages, or message parts, comprise, in addition to message content, a header or other section that constitutes a destination address or routing information. Thus, a large number of computers may communicate with each other over a large (or distributed) shared connection network without requiring individual "wires", or separate connections, between each pair of terminals. That is, since the message packets have routing or addressing information incorporated into them, many such packets may travel down the same section of "wire" with no confusion. Routing capabilities are incorporated into the network that direct the packets over the network to the appropriate destination, based on the packet address. While computers may be

programmed to separate their communications into packets, and wrap them in the appropriate "protocol" including addressing information, telephones and FAXs may not, in general, do so.

Thus, the purpose of this invention is to permit the use of terminals, such as FAX machines, intended for point-to-point dial-up communication, to be utilized as reception and/or transmission terminals on a packet switching-type network such as The Internet.

It should be noted that it is possible that some large point-to-point communication networks, at internal levels, may actually be implemented as packet switching networks. For example, once voice data arrives from a "point" to the local exchange it may be digitized and "packetized" to be transmitted over a network in a packet switching manner. At the destination exchange the packets would then be reassembled, converted back to analog and delivered to the reception "point". As far as this invention is concerned, this changes nothing. As far as the users at each end of the network are concerned, the connection is point-to-point with no addressing available other than to dial a particular user's telephone number.

Specifically, with regard to FAXs, it has been noted (in *The Whole Internet User's Guide & Catalog — Second Edition* by Ed Krol, Published by O'Reilly & Associates, Inc., November 1994, at Page 338) regarding the integration of FAX and Internet technologies, that: "the technologies are indeed merging, but not as quickly as you would anticipate ... computer people have viewed FAX as a lesser service, because the documents are not machine-readable, merely machine-transferable and -displayable ... What's there is not text, but a picture of the page". Thus, FAX and computer networks "have merged [only] to a limited extent". Routable in the outgoing direction only, it is possible to "take a file ... and send it via a modem to a FAX". To do that via the Internet "you have to create a really strange email address that contains the destination FAX machine's phone number. For example, say you wanted to send a FAX to Ed Krol, whose FAX phone number is 1-217-555-1234. You would send an email to the following address:

```
remote.printer.Ed_Krol/1120_DCL@12175551234.iddd.tpc.int
```

The Mailbox (the part to the left of the @) always starts with `remote.printer`. After `remote.printer` you can put some text that will be printed on the FAX's cover sheet ... No matter what the address looks like, the body of the mail message is just a normal email message. The test of the message is printed on the recipient's FAX machine."

As used herein, the term "machine-readable" graphic is used in the sense as used above by Mr. Krol; i.e., machine-intelligible, that is with content in a form capable of being understood by the machine, not "merely machine-transferable and -displayable".

Specifically, with regard to FAX on The Internet, the problem is that while there is (spotty, unreliable, volunteer-mediated, as of this date) outgoing service, to deliver EMail messages to a FAX machine located at a dial-up telephone number, there is no way at all for the receiver of that FAX to respond in kind. This deficiency is addressed below; and, its elimination permits a number of novel and useful services to be provided.

THE INVENTION IN BRIEF

As described above, it is possible for an EMail account holder on The Internet (or similar participant on a packet switching network) to send a file (text or image) to a FAX machine attached to a particular line (phone number) on a point-to-point communications network. This is done by specifying an address that incorporates (or, alternately incorporation in the message content would be possible) the point-to-point address (phone number) which, in turn, is translated or mapped to the address of a FAX server computer on the packet switching network. Thus, the message is routed to a server on the packet switching network which also has the ability to dial-up a FAX on the

point-to-point network; e.g., through the use of an installed FAX/Modem (or PC/FAX) card. The message text content is converted to a FAX image (or image content incorporated directly) and delivered over the phone in the usual FAX manner.

The problem, then, is that the recipient of the FAX cannot respond in kind. There is currently no way for the internet/FAX server to determine the required return routing information (e.g., an EMail address) from information provided by the recipient, or recipient's FAX machine. Various embodiments of the instant invention will overcome this limitation: with some ambiguity, or definitively; for "return" FAXs only, or for "initiated" FAXs as well.

SPECIFIC EMBODIMENTS

First, a flawed embodiment may be implemented with no modification of delivered messages by the FAX server. In this case, (return) routing information is deduced from the phone number called by, and/or from, the returning FAX machine.

In one case the recipient is directed (in the received cover sheet instructions) to call a particular phone number that is associated with only one (or a limited number of) account(s). This may work well when a server is dedicated to one, or a relatively few, account(s). However, in general, the server will be delivering messages for a large number of internet users compared to the number of lines or phone numbers it has associated with it. Nevertheless, identification of the number called by the FAX returning (or initiating) a call may be used by sensing it with DID (direct-inward-dial) technology.

A more practical embodiment would have recipients respond by calling one (or a small number of) phone number(s) incoming to the FAX server, and to then be directed to also enter (dial) an "extension" number that identifies the account (or even the specific communication) being responded to, or account being chosen for an initial communication (i.e., not a "reply"). The problem with this embodiment is that, since the extension needs to be entered, automatic FAXing may not be possible — a human operator may need to enter the extension when prompted.

In a third, related, embodiment the account identification, specific communication number identification, or routing information would be imbedded in the FAX ID field that is normally reserved to identify the sender. There are two problems with this embodiment, however. First, programming this field is usually a cumbersome process; done once, when the FAX machine is installed. Having to re-program the FAX before each transmission would, likely, be an unreasonable overhead. However, providing a convenient mechanism for doing this would be part of the instant invention and may take the form of: easier entry via fuller keyboard on a standard FAX machine; storing a "directory" of entries to be loaded into the ID field with a few keystrokes on a standard FAX machine; providing software to control the ID field used by a PC-FAX board (installed in a single machine or on a FAX server) from the keyboard or a stored directory. Second, as per FCC regulations, the ID field is supposed to identify the sender, not the recipient.

Whether entirely practical or not, these three embodiments have in common that the sending (returning) FAX machine provides to the internet server some indication of the internet account requested. Alternately, the identification is of a specific communication delivered earlier and, thus, the server may consult its records to determine the internet account that initiated the communication being responded to.

A second class of embodiments, instead, identifies the current sender (and, thus, presumably, the prior recipient) and, again, the server may consult its records to determine the internet account that initiated the communication being responded to. In one variation the sending FAX machine will be identified from the ID field supplied by the FAX machine; in another, the sending machine will be identified by "caller ID" information supplied by the phone company which identifies (in some cases) the number of the party (i.e., the FAX machine) making the

call.

The problem with both these embodiments is the ambiguity involved with identifying the FAX machine rather than the actual recipient or sender. Particularly in large organizations, several recipients may share the same FAX machine; similarly, several individuals with accounts on The Internet may send FAXs to the same individual using the same FAX machine. Thus, when a return FAX comes in, even if it can be identified as coming from a particular FAX machine (i.e., from a particular phone number or with a particular ID field) it may not be certain to whom the transmission should be returned to.

This problem may be partially overcome by identifying and combining both DID and caller ID. In this case, to a limited extent at least, multiple recipients at the same FAX may be separately identified. In particular, if the FAX server has N phone numbers under which it may receive FAXs (call them A, B, C, D ... N) then for each FAX number (FAX machine) that the FAX server delivers FAXs to, it may distinguish up to N separate accounts (or transmissions) to be responded to. For example, at each separate FAX machine: recipients being delivered FAXs from a first account are told (via instruction on the delivered cover sheet) to respond to phone number A; recipients being delivered FAXs from a second account are told (via instruction on the delivered cover sheet) to respond to phone number B; etc. This procedure may be carried out for as many (say M, numbered 1, 2, ... M) FAX numbers as the server delivers to. In this way as many as N x M pairs of DID and caller ID pairs may be identified for delivery to particular EMail accounts. In particular, if one EMail account user causes to have delivered FAXs to several different persons at a single FAX machine, each recipient would have to have a unique phone number to return FAX to if they were to be separately identified; otherwise they could all respond to the same return FAX number, and all their FAXs would be correctly returned to the same internet account holder, but individual respondents would not be automatically separately identifiable.

However, when someone is responding to a FAX received from an Internet account, the response may be made from a FAX machine other than from the one that received the original transmission, which is incompatible with the technique described directly above. Further, for initiated transmissions (rather than replies) there is no way to reasonably determine to whose Internet account to send the FAX to with these embodiments.

PREFERRED EMBODIMENTS

A preferred embodiment suitable for responding from a standard FAX machine, to a document received from an internet EMail user's account, works as follows.

The internet/FAX server would insert into the transmission to be delivered (anywhere, but nominally as a pre-cover sheet which is delivered first, even before any cover sheet provided by the internet user) a specially composed set of printed information that comprises, at least, an indication of the sending party (or their account) and, perhaps, a unique identification of the message itself. The message identifier would be composed of two parts (nominally): a prefix identifying the internet/FAX server, and a suffix consisting of a sequence number for the transmission. Thus, each server may keep an independent overlapping sequence list and, yet, each document on the network will have a unique identifier.

Additional information might be included indicating: sender's name, address, telephone and FAX numbers, EMail account (if not already indicated); recipient's name, address, telephone and FAX numbers; date; subject; priority; security level; etc.; perhaps, even the message content itself.

All of this information would be provided as a graphic image in "machine-readable format". An example of such a format is a bar code which is readable by the machine but, generally, not a human. A human-readable version may then also be provided. Alternately, some form of OCR text might be used which is readable by both machine and human. Whatever the case, the requirement is that the information on the cover sheet may be decoded by the internet/FAX server whenever it should encounter a FAXed back image of that cover sheet in the future. In

that case, the originator's internet or EMail account address would be decoded (or, the message sequence number, from which the sender's account may be looked up in a table) so that the FAX transmission would be deliverable to the originator's EMail account on some internet connected computer.

Thus, even from a point-to-point connected FAX machine, a FAX message may be submitted to the internet within which the required addressing information is incorporated in machine readable format; even though FAXs are considered by internet experts to be "documents [that] are not machine-readable, merely machine-transferable and -displayable" (see, earlier quotation).

For further details concerning "return coversheets" and other details of the use of machine-readable graphics with FAXs the reader is directed to Inventor's prior patent applications, cited above. In particular, directions to the recipient, on how to use the return cover sheet can be included on the return cover sheet; and, these directions can include what number(s) to call to contact the internet/FAX server, and directions on using the received coversheet as a pre-cover sheet to any reply.

An alternate preferred embodiment would be to provide the internet/FAX server with user account, or message sequence, information as follows. First, the directions to accomplish this may be provided on the delivered cover sheet, or may be provided via an automated dialog initiated by the internet/FAX server. Such, interactive sessions between a computer with a synthetic or pre-recorded voice, and a human at a keypad (or voicing responses) is common and, in and of itself, is not the substance of the instant invention.

In either case, the return user would enter the message sequence number (presumably all numeric to facilitate easy entry) from the telephone's numeric keypad (or, by voice recognition or voice response to specific automatically generated audio directions — e.g., "press or say 1 now" — as is now common), perhaps terminated by the (#) "pound" key. From the message sequence number, the internet/FAX server would look up the EMail account of the initiating message sender, and use that to deliver the return message. Similarly, the internet/FAX server, in the original delivery, may supply a substitute, all numeric (for ease of telephone keypad entry) representation of the originator's EMail account. Such substitution may be accomplished (and reversed) by a standard that is either network-wide or just known to the local internet/FAX server. Alternately, an alphanumeric EMail account number may be entered as follows. For example, the "2" touchtone key also contains "A", "B" and "C". In this case A is entered as 21, B as 22, and C as 23; or A as 2, B as 22, and C as 222. Systems that use such entry algorithms often use 11, 12 and 13 as "Q", "Z" and "space". Such data entry from a telephone keypad is common and, in and of itself, is not generally the substance of the instant invention. For internet addresses, assigning 01, 02, 03, 04 and 05 (or some other key combination) to "@", ".", ":", "/" and "_" would also be useful.

The only problem with this second preferred embodiment is that the interactive session may be cumbersome and requires human intervention and, thus, would interfere with automated, unattended FAXing of the return document.

In all cases when someone is responding to a received FAX which comprises "fill in the form" type content, the following techniques may be used for greater efficiency. First the "fill-in" sections may be excised by the FAX server (which will have been supplied with a template by the original sender) and only those returned, to be optionally re-integrated into the form at the originator's computer. Alternately, the fill-ins may be OCR converted to text and returned. In either case, eliminating return of the form will reduce transmission and storage requirements and, for returns of many like responses to broadcast-FAX messages, can be very efficient.

One way to affect a similar benefit, without the return internet/FAX server having to be provided with a cut-out template, is for the server to keep a copy of the original transmission and to then "subtract" that from the response. The original image can be translated, rotated or scaled (and Inventor's "framing information", disclosed in his prior patent applications) in order to register it with the returned FAX prior to subtraction. The result after subtraction will be just the information added by the recipient, prior to returning the form.

Similarly, for mark-sense forms returned via an internet/FAX server, the mark-sense analysis may be done at the server, and only the results returned as ASCII EMail.

ALTERNATIVE PREFERRED EMBODIMENTS

The preceding section concerned how a recipient at a standard FAX machine, of an internet-initiated communication, might respond to the initiating user.

Alternately, someone at a standard FAX machine may want to initiate such a communication to an internet EMail account or similarly addressed network location. In that case the previous embodiments may be adapted.

In reverse order, the interactive keypad entry mechanism may be used almost exactly as described. All that is required is that the user know a phone number to call a connection into the internet/FAX server, and an EMail account designation or other address to enter. The "machine-readable graphic" embodiment is a bit more complicated.

A first approach requires a PC with a dot-matrix, laser or other graphic capable printer. In that case, the user with the FAX machine would be provided with software which would print the entered EMail account address (and any other coversheet information, such as sender's name and FAX number, subject, etc., which may then be displayed as a summary at recipient's computer by EMail management software) in a bar code, OCR-type text, or other machine-readable graphic form. This would then (nominally) be used as the first sheet when FAXing to the internet/FAX server.

A second approach does not require special software but, instead, special forms to indicate the EMail address. Several types of such forms may be used. One is "mark-sense" in which one of a column of small boxes is marked for each position, as often used when answering standardized tests. Another is a form with specific boxes outlined where a letter or digit is to be carefully hand printed or typed into each box. Another would be where a specific place on a sheet were indicated where a EMail address would be carefully hand printed or typed for OCR analysis.

In a third approach, neither software nor forms would be required. Instead, a "standard" would be established that would assist the internet/FAX server to identify a carefully hand-written or typed EMail address. As an example only, of one such standard, the EMail address (perhaps double spaced) (103) would be by itself in the top several inches of the first sheet framed by "=" (101) and "*" (102) and, optionally, would be followed (or preceded) by an example of the alphabet in a specific "standardized" order (104), also perhaps double spaced, which would be used to help any OCR software identify the characters in the EMail address (103). See Figure 1. A non-proportionally-spaced typeface would be preferred to ease OCR requirements, as would a larger font size. If the EMail address could not be decoded, an error message would be returned to the initiating FAX machine as identified by the FAX ID field or caller ID information. However, in this situation (and any others where an address could not be automatically determined), prior to giving up on delivery, a human system administrator might be notified to apply "human character recognition" to the situation by locating, reading and typing into the computer, the EMail address.

In a fourth approach, a more free-form cover sheet would be analyzed by the internet/ FAX server utilizing more "intelligent" software as described in Inventor's earlier patent applications, referenced above. Here, however, the software would be fine-tuned to extract an EMail account; which may be facilitated by: first locating any "@" characters; then looking for proper form; and, then checking for a valid account — for example by using the UNIX commend FINGER. Again, human intervention and automatic error notification could be applied in the event of failure to automatically recognize a valid EMail account.

A fifth approach incorporates the first approach described above into an otherwise standard, stand-alone or server-variety, FAX machine of somewhat revised manufacture. In that case, the EMail address or other non-

content information would be entered by a user from a keyboard; or an index into a previously stored table of entries would be entered, such as the mechanism used to store 7 or 11 digit (or longer for international and extension-added numbers) phone numbers in an "autodialer" and retrieve them by the entry of only 1 or 2 digits. This information would then be directly converted (rather than printed and then scanned by the FAX) to a compressed FAX transmission format image which is equivalent to the machine-readable graphic (e.g., barcode, OCR text, etc.) cover sheet, and which would then precede (or, possibly, follow) the otherwise standard FAX transmission.

Similarly, the FAX machine could be modified so that the entered information would be conveniently and automatically put into the FAX ID Field. Alternately, the entered information could be made to reside in a new digital information field that would precede (or, more likely, follow) the otherwise standard FAX transmission, only to be recognized by FAX machines or servers programmed in accordance with this new digital field in mind.

The reason that the new field would, most effectively, follow the standard transmission is that standard FAX machines would, in that way, receive a standard FAX transmission and then shut down. Receiving FAX machines programmed with this new field in mind would, at the termination of the standard FAX transmission, continue to listen for the new information field. If the new field were present, after the completion of the standard transmission, a FAX machine programmed to look for it would receive the information. If the new field were not present, a FAX machine programmed to look for it would eventually "time out" and shut down the connection.

APPLICATIONS

Once the basic mechanisms, described above, permit a FAX machine to be used in both directions as a (limited) internet terminal, many applications are possible and include, without limitation, the following. Generally, these may be available in other systems and, in general, in and of themselves, are not the substance of the instant invention; although, internet or related implementations of these services are novel and would be part of the instant invention. They will, thus, not be described in detail.

Broadcast FAX — in which a single transmission (initiated from an EMail account or FAX machine) may be delivered by the network to many recipients (at both FAXs and EMail accounts).

Delayed FAX (store and forward service) — a FAX may be scheduled to be delivered at a later time for: convenience, cost reduction, busy signal, etc.

Confirmation — a return message (either FAX or Email, as appropriate) may be delivered to sender when recipient (or at least recipient's machine) has received the message. If delivered as EMail, confirmation of reading (i.e., accessing the delivered file) may also be given.

FAX On Demand — in which FAX transmissions are sent in response to an automated voice and keypad telephone session, may now be delivered via the internet and may include any internet mediated information, such as World Wide Web pages or archived text; or even a request to be added to a mailing list. Further, the "demand" may now be initiated by FAX (via barcode, OCR, mark sense, or just sending a request or even a "null message" to an EMail account) or EMail, rather than just by interactive voice/keyboard sessions.

In particular, since FAX machines are, by these techniques, limited internet terminals, FAX transmissions may now travel: from a first FAX machine, to a first internet/FAX server, over the internetwork, to a second internet/FAX server, to a second FAX machine. See Figure 2. Thus, many services, such as some of those listed above, not available by dialing direct, FAX machine to FAX machine, would now be routinely available, via software programmed on the internet/FAX server and via the internet. Also, cost reduction may be achieved for long distance FAX transmissions by using The Internet for the "long haul" portion of the transmission.

Additionally, Inventor has disclosed, in his prior patent applications, techniques he calls "secure FAX". These techniques may be incorporated into the internet/FAX server so that FAXs incoming to the server (or generated by the server from EMail text) may be "scrambled" so as provide secure transmission and storage of such

communications. They may then be automatically unscrambled prior to delivery as a FAX, or delivered as secure FAXs. Similarly, communications coming in from a FAX intended to be delivered to an EMail account may be scrambled by the internet/FAX server for secure delivery over the relatively public and insecure internet, and then only unscrambled by the recipient at his computer by entering a password or de-encryption key. In particular, some forms of secure "electronic commerce" may be affected by a variation on this method, transmitting scrambled signatures or other information.

ANOTHER APPLICATION — THE PHANTOM OR VIRTUAL EMAIL ACCOUNT

One particularly useful application of the techniques described herein is the establishment of a "phantom" or "virtual" EMail account for people who do not have access to (or do not want to use) such an account via computer terminal or PC. Such people would be able to receive and send EMail via FAX. For example, many people who now routinely conduct business communication via FAX do not want to go the added expense of acquiring and/or the effort of learning to use on-line communication services. Nevertheless, many other people expect to be able to communicate by EMail and, so, such a virtual EMail account would be of benefit.

Such a party could notify people about their EMail account (e.g., in advertizements, on business cards or letterhead, or any other way) as if it were a standard EMail account; it could have a standard-seeming EMail name rather than a phone number. Any EMail sent to them would arrive at the local internet/FAX server and then be converted from text to image and forwarded to their FAX.

Such forwarding might occur as each EMail message arrived. Alternately, forwarding might occur on a demand basis, by placing a call to the internet/FAX server and entering an ID and request code; and delivery to some FAX machine other than the default, office, FAX machine might also be specified for FAX forwarding, while "on the road" or at home, for example. A third alternative would be for messages to be delivered *en masse* at a convenient time; for example, at night, when network and/or FAX traffic are usually reduced and sometimes less expensive.

[A related service permits the holder of a standard EMail account to call into an internet/FAX server and "pick up" their EMail by requesting the server to convert the EMail messages to images of text and have them delivered to a default, or keyed in, FAX machine. Off-the-shelf text-to-voice software may "read" the sender and reference line of each message so that the user may select (by keying) which messages to forward and which to hold as text, as well as which to delete after sending and which to retain.

In addition, any other available internet resources may similarly be requested to be delivered by FAX, rather than to an computer-based internet account. These include, without limitation, archived text files, computerized database search results, World Wide Web pages, etc.]

Using the return coversheet delivered with each message, responses could be returned to any parties sending EMail. One particularly useful option here would be the conversion of the FAXed back EMail from FAX image to ASCII text, prior to returning it as EMail to some party who sent EMail from a standard EMail account. In this way the "virtual, FAX-mediated" nature of the InterFAX account would be hidden.

Such conversion can be accomplished by any number of currently available OCR software packages which might be installed on the internet/FAX server. In order to facilitate easy and accurate OCR conversion, the following techniques can be applied by the users of such a service. First, if using a wordprocessor, printing documents to be FAXed in a large (e.g., 14 point or more) typeface will improve results; printing using a mono-spaced (rather than proportionally spaced) typeface will improve results; using the same typeface each time (for which the OCR software may be fine-tuned, and such specification or fine-tuning stored and recalled for each user's account) will improve results. Sending an example of the typeface alphabet, in a standardized order (as shown in Figure 1, used with an EMail address) can help.

Alternately, a software application could be supplied to each user with such an InterFAX account which would convert EMail text to a series of dots or other characters which may then be re-converted back to text at the internet/FAX server. Inventor calls such technology the "Paper Modem" and this is discussed in greater detail in his prior patent applications, cited above.

Alternately, if an image were to be delivered, rather than ASCII text, a common image format might be chosen, such as TIFF, which most recipients would likely be able to display. Or, a display utility might be delivered by the internet/FAX server, appended to the EMail transmission (or, at least, a note as to how to request delivery of such a utility via the internet). Binary (non-ASCII-text) files, such as an image file or display utility, must usually be converted to a peculiar text format, such as by a UNIX utility called UUENCODE, prior to sending as EMail, and converted back by the complementary utility UUDECODE. The display utility (or note) may only be sent the first (few) times such InterFAX EMail were sent to a particular party (account) on the net — to be suppressed once a particular user is assumed to be familiar with the procedure. Alternately, part of the "note" may be instructions on how to send EMail to a particular account accessible to the internet/FAX server involved to register one's EMail address as an "experienced" user and, thus, not in further need of the utility or note.

For InterFAX EMail that such a party wants to initiate rather than respond to, various methods have been described elsewhere herein to facilitate the specification of an EMail delivery address. The FAX to text conversion techniques described elsewhere herein can also be applied here as well.

THE INTERNET PHANTOM OR VIRTUAL FAX ACCOUNT

Similarly, a complementary service can provide to a user an EMail account that will function as a "phantom" or "virtual" FAX machine. This would be useful for people who have an EMail account but who do not want to go to the trouble/expense of obtaining a FAX machine or second telephone line, or who do not want to go to the inconvenience or lack of reliability and security associated with using a shared or "public" FAX at a copy shop or in an office. There are many people who focus communication on their computers, and this will permit them to conveniently communicate with others who rely on FAX for business communication.

In this case, the intent will be to provide a mechanism that appears to the public, and particularly those who carry out business by FAX, as a FAX number but which, for the account owner, functions as an EMail account. Outgoing EMail-to-FAX communication would operate as already described; as would machine-readable graphic return coversheet technology.

However, the idea here is to be able to publish a seemingly standard FAX number — in an advertizement, on a business card, etc. — and have an internet/FAX server receive incoming FAXs for forwarding to the user's EMail account (perhaps after OCR conversion to text).

One approach is for each user to have a separate telephone line coming into the internet/ FAX server; however, this will be expensive. A less expensive alternative is to have a single (or a few) physical line(s) which respond(s) to a range of dialed numbers. Separate numbers within the range are then distinguished by DID technology and converted to a user's EMail address by consulting a table.

A third alternative is to use one phone number for multiple user accounts and to publish an extension to be dialed in after the main number which, again, would correspond to an EMail account or address.

A fourth approach (which will not hide as well, the virtual nature of this FAX machine) is to have the FAX originator call a common number, there to be instructed to enter their FAX machine number and a published code for the recipient. These would be stored by the internet/FAX server and, using caller ID technology, when a FAX came in from the FAX machine specified during the dialog, it would be identified as intended for the user's account.

BILLING

In general, billing for such services is not considered part of the invention. However, it is noted that: either the sender or recipient may be billed; either the EMail or FAX user may be billed; billing may be mediated by the internet or a phone company, and may be available only on an account basis only, or offered to the general public; and, 800 number, 900 number, calling card, credit card or any other billing options may be used.

DESCRIPTIONS OF DRAWINGS

Figure 1 has already been described in the section entitled ALTERNATE PREFERRED EMBODIMENTS.

Figure 3 shows how a message (311) originated on an internet connected machine (310) (e.g., from an EMail account (312)) is passed to an internet/FAX server (304) over the internet (309), and is then passed from the internet/FAX server (304) to a standard FAX machine (or computer-based FAX server) (301), at a standard telephone dial-up number (302), over a standard dial-up telephone line (303). Included in the internet/FAX server (304) is a FAX/Modem (also called a PC/FAX card, and which may be also comprise operating routines, supplied in PROMs or as separate software) (305) or equivalent, and software that: converts the EMail text to FAX image (306); generates the bar code or other machine-readable graphic for the return coversheet (307); and, keeps a record of the transmission (308) including, for example, a sequence number and the originating EMail account number.

Figure 4 shows a FAX message content (405), which message also includes addressing information in a barcoded or OCR coversheet (403) or as account ID information (404), originated on a standard FAX machine (or FAX server) (401), which machine is connected to a standard dial-up phone number (402). The FAX information is passed over a standard dial-up phone line (406) to an internet/FAX server (407), and is then delivered to an EMail or other internet account (413) residing on the recipient's computer (412) via the internet (411). Included in the internet/FAX server (407) is a FAX-Modem (408) and software to: read and decode the barcode or OCR information identifying the internet account for delivery (409); and, look up an internet account number from a document sequence number (if needed) and initiate an EMail message to that EMail account (410).

Figure 2 shows how two standard FAXs (201) and (207) which operate as in Figure 3 and Figure 4 can communicate with each other by connecting to two internet/FAX servers (203) and (205) via standard dial-up lined (202) and (206); the two internet/FAX servers (203) and (205) communicate with each other over the internet (204).

Figure 5 shows a more detailed diagram of element (304) of Figure 3, the internet/FAX server, in EMail to FAX mode of operation. An EMail message (501), comprising both content and address, is received by the internet/FAX server, via the internet, and a software routine (502) extracts the recipient's phone number embedded in the EMail address. Alternately, for some embodiments, the EMail address will specify an apparently standard account (nominally, but not necessarily, on the server machine) which will be known to the server to be an alias for a FAX number and, in that case, the recipient's phone number will be looked up in a table accessible by the server. An additional software routine (503) will generate a special return cover sheet with human readable information, as is usual, and a machine-readable (e.g., barcoded or OCR printed) document sequence number and/or Email account designation as described above. A third software routine (504) will convert the ASCII text of the EMail content to a FAX image of that text. The EMail may also contain information already in image form which will not require such conversion.

FAX image element outputs from (503) and (504) are combined into the total FAX content (505) and is delivered along with the phone number (506) generated by (502) to a PC/FAX card or equivalent (507) equipment in the internet/FAX server.

Element (507) under control of the computer which comprises the bulk of the internet/FAX server then calls up a standard FAX machine or equivalent (509) over a standard dial-up telephone line (508) to deliver composite FAX document (505).

Figure 6 shows a more detailed diagram of elements, (401) a FAX machine and (407) the internet/FAX

server, of Figure 4, in FAX to EMail mode of operation. A standard FAX machine or equivalent (600) produces scanned FAX information of a document's content (601) which is transmitted as content (605) with a separate or integrated EMail address or document sequence number (606). Element (606) comprises some combination of three alternatives: a machine readable graphic (e.g., barcode, OCR text, etc.) on the coversheet (602); user entry from a telephone keypad (603); or, information placed in the FAX ID Field of the FAX transmission (604). Elements (605) and (606) are sent together as a complete FAX transmission (607) over a standard dial-up telephone line (608) to internet/ FAX server (609).

Internet/FAX server (609) is an internet-connected computer system that comprises, in addition to standard computer components, a PC/FAX card or equivalent (610) capable of: receiving FAX transmissions (611); decoding DTMF telephone keypad tones (612); and, carrying on an interactive voice script with the user (613); in addition to several software routines. The routines comprise: software (614) to convert FAX content (605) to a computer image format, such as TIFF (615); optional software (616) to process that computer image (615) by OCR algorithms (616), converting the image information to ASCII text format (617); and some combination of three elements, directly corresponding to which combination of elements (602), (603) and (604) were utilized in transmission, to derive the document sequence number or EMail address. Of the three alternatives: software routine (618) derives that information by decoding the machine-readable (e.g., barcode or OCR text) coversheet (602); software routine (619) converts DTMF tones (603) from the interactive script; and, software routine (620) reads the FAX ID Field (604) from the PC FAX card.

In addition, the internet/FAX server computer contains software that will (if needed) look up the recipient's EMail address from a table referenced by the sequence numbers of any previously delivered documents (621); internet EMail generation software (622) that sends content (605), (615) and/or (617) to the address derived from some combination of (618), (619), (620) and (621); and a physical connection (623) controlled by communication software (624) to the internet (625).

For all the system diagrams depicted herein, the structures shown are exemplary, some elements may be organized differently, combined into a single element, split into two or more elements, omitted entirely, or provided by a different mechanism. However, the depicted systems will work. In particular, some of these functions may be carried out by hardware components, such as a PC/FAX card; or by software routines residing on, or supplied with, such a component, or available on the server system or via the internet.

The information flow already shown in Figure 3 and Figure 5 is again described, this time as a Software Flow Diagram in Figure 7. An EMail message arrives at the internet/FAX server in the usual manner (700). At that point the address of the recipient is verified as a valid delivery to this site (701) and, if not, the mail and an error message are "bounced back" to the originator of the EMailing.

If the address is valid it is checked (702) to determine if the "EMailbox" specified is a standard (i.e., non-FAX) address and, if it is standard address, the EMail is delivered as standard EMail. Otherwise, delivery to a FAX machine is determined (703) by extracting a phone number from the EMail address itself, or by accessing a table of valid accounts accessible by this site and determining that the EMail address is actually a "phantom" or "virtual" address which is meant to appear as a standard EMail address but which, in actuality, is an "alias" for FAX delivery of EMail.

A unique sequence number for the document is generated (704); uniqueness may be guaranteed by prefixing the Server's site address to a local sequence number which is constantly incremented.

A machine-readable graphic (e.g., barcode or local OCR standard) return coversheet is generated (705) which included coded versions of the sender's EMail address and/or the document's sequence number, and which may include other information such as recipient data, etc. In addition, human-readable printed instructions to the recipient, such as how to use a return cover sheet when responding, can also be included in this cover sheet.

The text (presumably ASCII) of sender's message is converted (706) to an image of that text, perhaps in a format such as TIFF, or perhaps directly into compressed FAX transmission format. This is integrated with any elements of the EMail content which are already in graphic or image format, and with the image of the coversheet generated at (705) above. The composite message image is then converted (707), if necessary, to compressed FAX transmission format.

The content, via (707), is scheduled (perhaps delayed for convenience, or to lower phone tolls) for delivery (708) to the phone number derived at (703) and an entry of relevant transaction information is made. The transaction record is updated when delivery is actually affected, or given up on.

Delivery is affected (709) via a PC/FAX card or equivalent mechanism over a dial-up telephone line and retried until successful, or until a maximum number of attempts has been made. If delivery is unsuccessful the originator is notified by return EMail. Similarly, successful delivery may also cause notification to originator.

The information flow already shown in Figure 4 and Figure 6 is again described, this time as a Software Flow Diagram in Figure 8. A FAX message, with optional voice/keypad interaction from the user, arrives at the internet/FAX server (800). At that point the EMail address of the intended recipient must be determined and can be an any of (or any combination of) eight ways. [In particular, it may be determined that the message is to be delivered to another FAX location in which case it may be forwarded there, via the internet and another internet/FAX server, as shown in Figure 2. Otherwise, if delivery is to be a(n apparently) standard EMail account the depicted software/process flow is followed.] The eight methods of identification of the intended EMail account (either directly or, indirectly, by referencing a document sequence number which is associated with an originator's EMail account) include the following.

The DID of the specific internet/FAX server phone number called by the FAX machine may be used to reference (801) a table linking such numbers with EMail account addresses.

The Caller ID of the telephone number that the FAX machine calls from and may be used to reference (802) a table linking such numbers with EMail account addresses.

The FAX ID Field of the incoming FAX message may be consulted to specify (803) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

A non-standard digital header, footer, or other inserted information, contained in the incoming FAX message can be consulted to specify (804) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

Information contained in a machine-readable graphic (e.g., a barcode or OCR text) residing on the coversheet (perhaps, a return coversheet supplied by the internet/FAX server with a FAX previously delivered to the current sender) or in the body of the incoming FAX can be detected, decoded and consulted to specify (805) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

Similarly, an agreed upon "standard" format for information residing on the coversheet (such as depicted in Figure 1) or in the body of the incoming FAX can be detected, decoded and consulted to specify (806) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

In the absence of an agreed upon "standard" format, information residing on the coversheet or in the body of the incoming FAX, may be analyzed by an intelligent computer program, as described in Inventor's prior patent applications, referenced above, to detect, decode and specify (807) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

Information can be input by sender via the touchtone keypad, directly as an "extension" or during an interactive session further comprising synthesized or pre-recorded voice segments from the computer, and the DTMF

tones detected, decoded and consulted to specify (808) an EMail account, document sequence number or other reference into a table linking such references with EMail account addresses.

At that point an EMail address has been determined; in addition, by the same mechanisms, other information may be specified by the sender, for example, sender's name or EMail address, a reference line, and options such as whether to convert the FAX content from image to text before sending, delivery priority, etc.

The incoming FAX is (usually) translated (809) from compressed FAX-translation-format to a more usual computer image format, such as TIFF. Optionally, if specified by the user, or if the default procedure for this user's account established at the internet/FAX server, the FAX content is further converted (810) via OCR to text, presumably ASCII, in standard EMail format; or further converted via Inventor's "paper modem" technology to 'text' or 'binary' digital format. In this way, the recipient, if a holder of a standard EMail account, may access the message as standard EMail text, without having to access a graphic software utility to display the FAX message as an image. The recipient may, thus, be totally unaware that the message originated at a FAX machine rather than a standard EMail account.

In either case, the text or image format message is formatted as the content part of an EMail message (for example, using UUENCODE to permit a binary image or compressed image file to be transmitted as a non-binary-mode text message) which is then submitted to The Internet (811) for delivery to the EMail account derived by any combination of steps (801-808) above.

The flows depicted in the software flow diagrams herein are exemplary, some items may be ordered differently, combined in a single step, skipped entirely, or accomplished in a different manner. However, the depicted flows will work. In particular, some of these functions may be carried out by hardware components, such as a PC/FAX card; or by software routines residing on, or supplied with, such a component, or available on the server system or via the internet.

AVAILABILITY OF ELEMENTS OF TECHNOLOGY

It should be noted that the vast majority of individual elements of the foregoing invention are available "off-the-shelf" as hardware and software components, and are easily integrateable by one of ordinary skill in computer systems programming, integration and administration.

Specifically, computer add-in hardware boards are available to provide FAX/Modem capabilities, and "voice mail" capabilities (i.e., voice recording and playback, sensing of DTMF keypad entry, and reading of embedded DID and Caller ID signals). These components are available from many vendors and many developer-level software routines and whole application programs are available to operate such boards. These software routines can be coordinated and made to communicate and exchange information under operating systems such as UNIX, DOS, Windows, or System 7.

Similarly, the communication, EMailing and other software functions that make up "The Internet" are widely know and available and their use and adaption are well within the ken of one of ordinary skill in computer network administration.

Thus, the various technological elements that comprise the invention disclosed herein are (except as described otherwise) standard, well-known, widely available elements. Their construction, operation, use and integration are not, in general, the subject of the instant invention. For the details of the construction, operation, use and integration of these components the practitioner is directed to the available published literature, as well as software and equipment manuals, in the areas of hardware, software and information formats relating to, without limitation: FAX machines, FAX/Modems, FAX servers, voice mail devices, barcode printing, barcode scanning, optical character recognition, computer communication and networking (including, specifically, EMail, The Internet, and related communication and information exchange protocols such as HTTP, UDP, TCP/IP, etc.) and computers

and operating systems.

Many of the elements of the present invention are available "off-the-shelf" and, in and of themselves, not inventive. However, the design, construction and operation of the composite systems and techniques disclosed herein, as well as the use to which they are put, are the subject of the instant invention and are presented as novel and useful. These novel, composite, high-level system designs are described herein and depicted in the accompanying system and flow diagrams.

Finally, it is noted that the capabilities and system components described herein may be provided by equivalently functioning substitutes. For example: signals and hardware may be of analog or digital construction; certain functions may be exist as special purpose hardware, or as programming residing on general purpose hardware; software may be provided on PROMs, or be stored in memory or on magnetic or optical disk; various capabilities may, in different situations, reside in a FAX machine, FAX/Modem in a computer, in a local computer, or in a remote computer; many options exist for FAX-to-FAX, FAX-to-computer or computer-to-computer interconnection; etc. The use of any appropriate system component, now in use or later developed, to affect the methods and systems described herein, is considered to be within the scope of the instant invention.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and certain changes may be made in carrying out the above method and in the construction set forth. Accordingly, it is intended that all matter contained in the above description or shown in the accompanying figures shall be interpreted as illustrative and not in a limiting sense.

While there has been shown and described what are considered to be preferred embodiments of the invention, it will, of course, be understood that various modifications and changes in form or detail could readily be made without departing from the spirit of the invention. It is, therefore, intended that the invention be not limited to the exact form and detail herein shown and described, nor to anything less than the whole of the invention herein disclosed as hereinafter claimed.

I claim:

CLAIMS

1. A method for specifying information from which a packet-switching network address may be derived by incorporating into a transmission intended for FAX reception a machine-readable graphic comprising said addressing information.

2. A method for facilitating the routing via a packet-switching network of a communication such as a FAX initiated from a dial-up source by incorporating into the dial-up transmission information auxiliary to the message content from which can be automatically derived a network address.

3. A method for routing via a packet-switching network a communication such as a FAX transmission derived from a dial-up source by incorporating information auxiliary to the message content into that transmission and passing it on to a packet-switching network which additional information comprises a network address.

4. A method as in claim 2 wherein said auxiliary information comprises a machine-readable graphic.

5. A method as in claim 4 wherein said machine-readable graphic comprises a barcode.

6. A method as in claim 4 wherein said machine-readable graphic comprises OCR text.

7. A method as in claim 4 wherein said machine-readable graphic comprises a filled in mark-sense form.

8. A method as in claim 4 wherein said machine-readable graphic comprises a specially formatted printing of network addressing information.

9. A method as in claim 2 wherein said auxiliary information comprises DTMF tones.

10. A method as in claim 2 wherein said auxiliary information comprises DID information.

11. A method as in claim 2 wherein said auxiliary information comprises caller ID information.

12. A method as in claim 2 wherein said auxiliary information comprises FAX ID field information.

13. A method as in claim 2 wherein said auxiliary information comprises a digital information field additional to those normally included in a Group 3 FAX transmission.

14. A method as in claim 3 wherein said auxiliary information is derived from intelligent analysis of the FAX content by the steps of:

   a. decoding an encoded document FAX transmission into a document image in raster format;

   b. format analysis of the output of said decoding step, to analyze the document raster image and identify and type at least one image section, and producing a sectioned document image;

c. at least one graphic decoding/conversion process, each keyed to a particular type of document image section, to process the output of said format analysis step, to decode at least one document image section and convert its content to a machine-usable coded document section; and,

d. context dependent extraction, to process the output of the graphic decoding/conversion step, that will analyze one or more machine-usable coded document sections to identify and extract document/recipient information.

15. A method for facilitating a virtual EMail account affected at least in part by the method of claim 3.

16. A method for facilitating a virtual FAX machine account affected at least in part by the method of claim 3.

17. A method as in claim 15 comprising the additional step of converting a FAX image of text to ASCII by OCR techniques.

18. A method as in claim 16 comprising the additional step of converting a FAX image of text to ASCII by OCR techniques.

19. A method for forwarding already delivered EMail residing in an EMailbox to the intended recipient via FAX comprising:

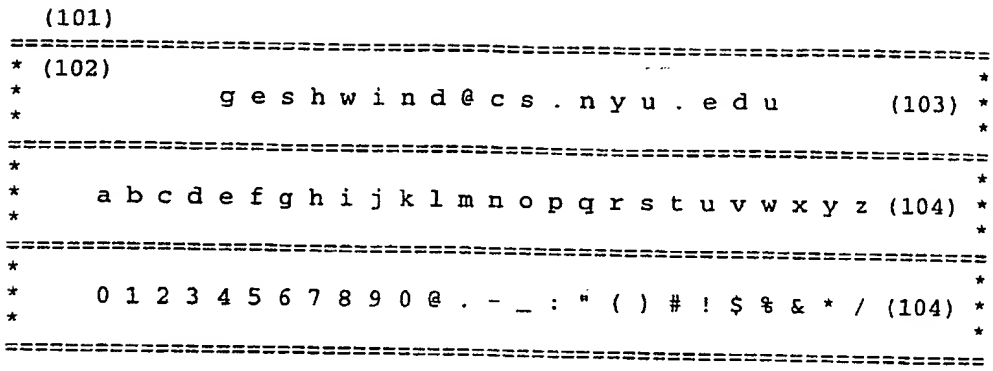
a. converting EMail to compressed FAX transmission image format; and,

b. delivering via FAX/Modem said EMail converted to FAX compressed transmission image format to a standard FAX machine.

20. A method for picking up EMail comprising:

a. telephoning a network/FAX server; and,

b. entering a request to said network/FAX server for delivery affected by the method of claim 19.



The rest of user's standard cover sheet, or message content starts here.

FIGURE 1: Coversheet for FAX Initiated Message to Internet EMail Account

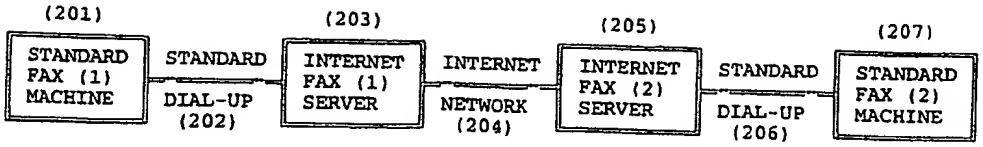


FIGURE 2: System Diagram of FAX to FAX Delivery Via Internet
(Message Flow Left to Right)

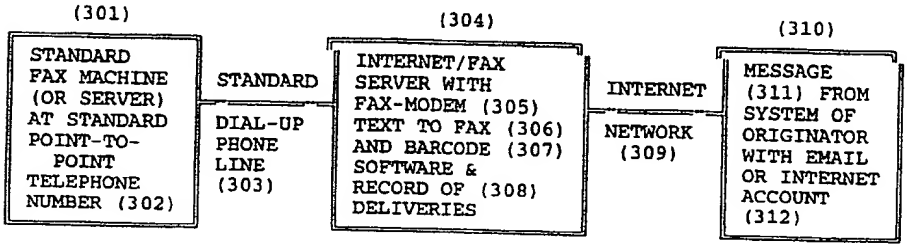


FIGURE 3: System Diagram of Internet Account to FAX Delivery
(Message Flow Right to Left)

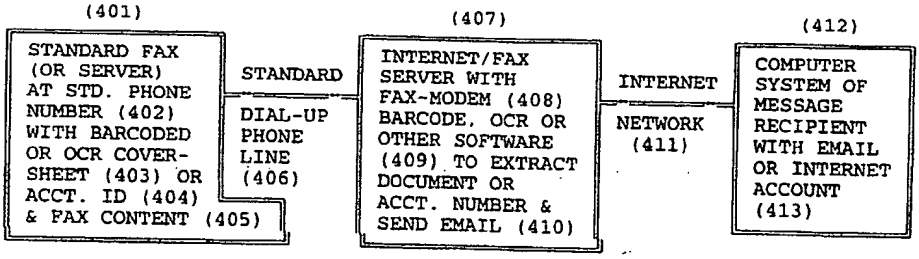


FIGURE 4: System Diagram of FAX to Internet Account Delivery
(Message Flow Left to Right)

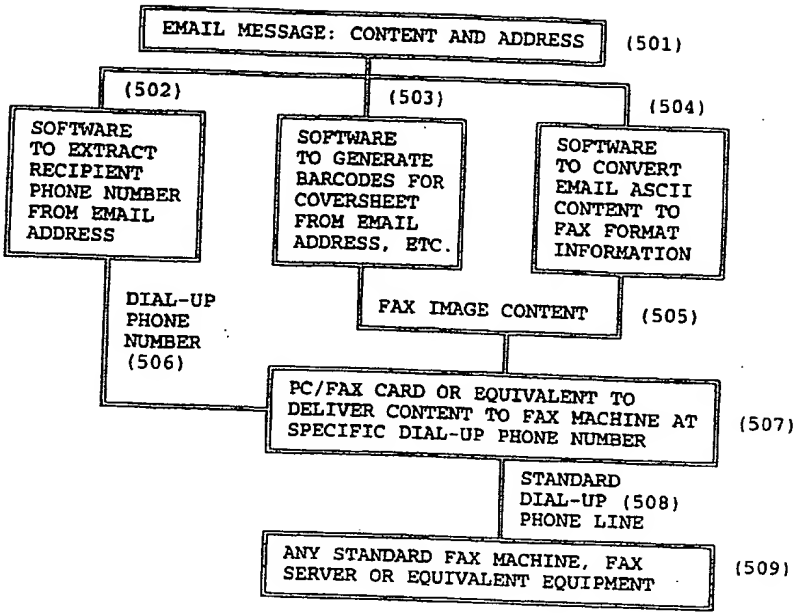


FIGURE 5: Block Diagram of Internet/FAX Server in Internet EMail to FAX Mode

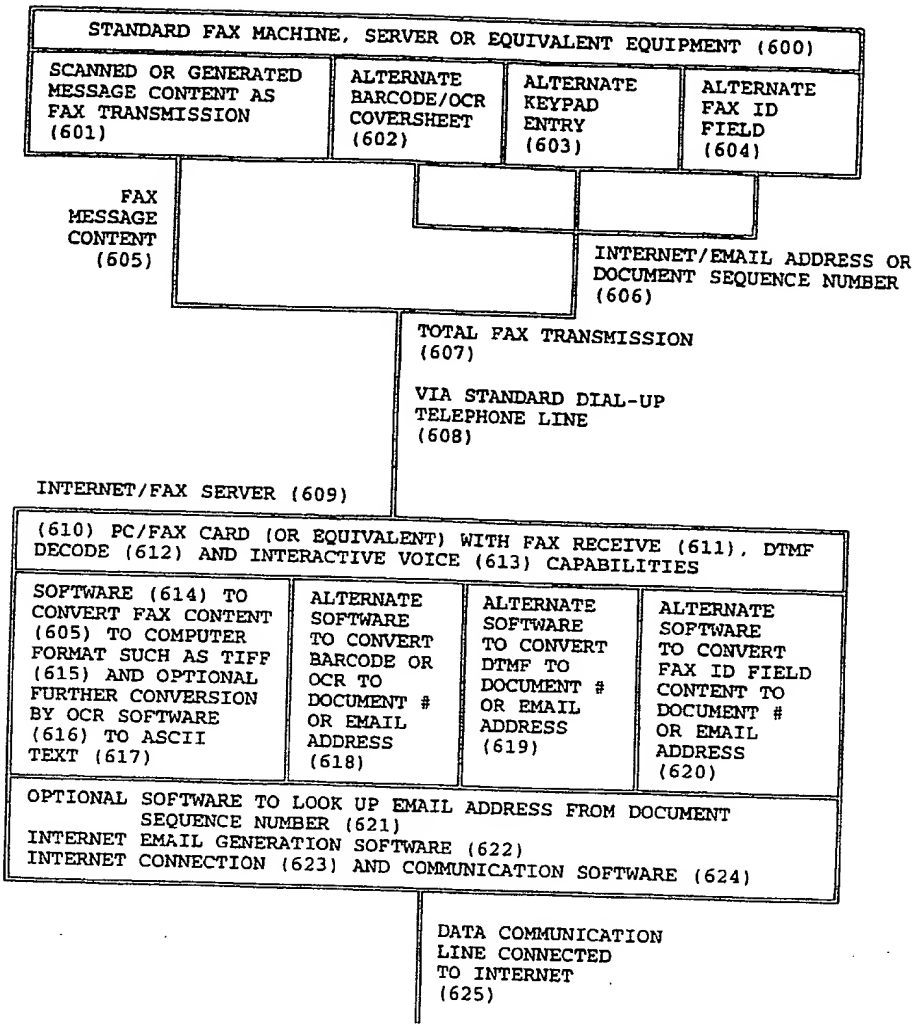


FIGURE 6: Block Diagram of Internet/FAX Server in FAX to Internet EMail Mode

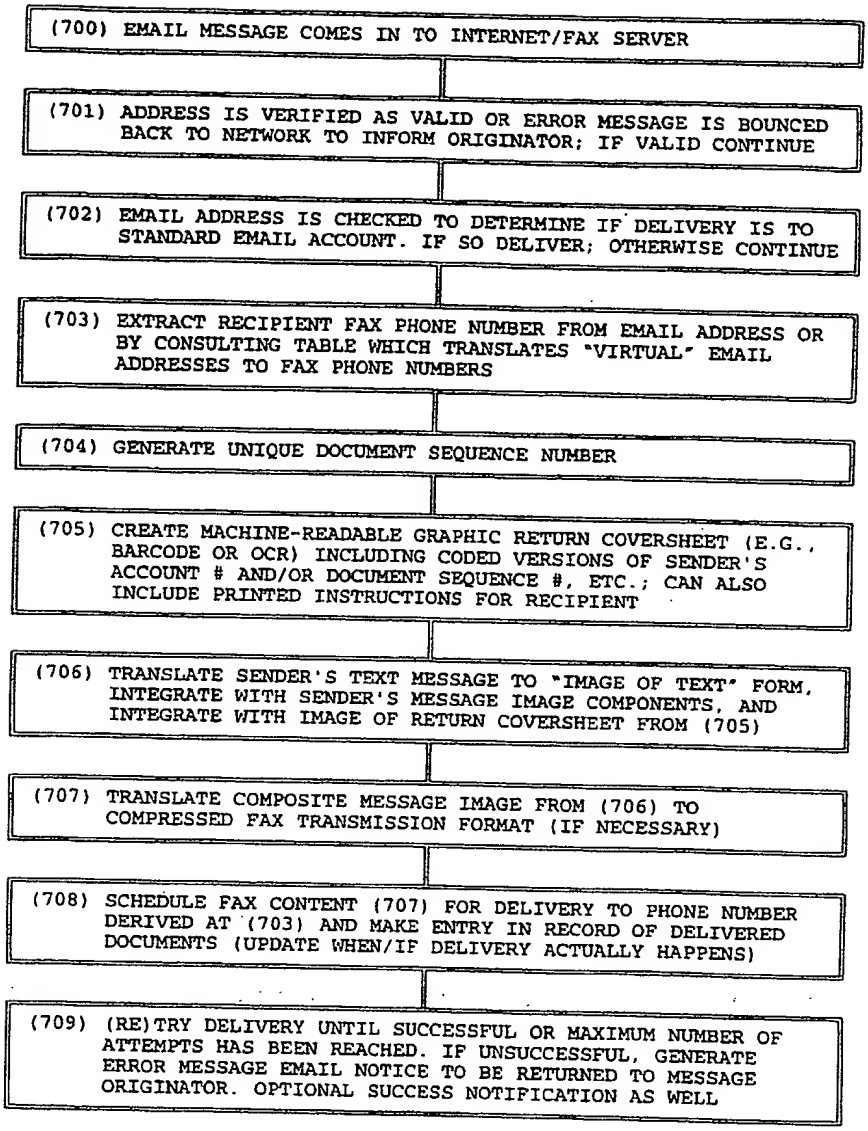


FIGURE 7: Software Flow Diagram of Internet/FAX Server in Internet EMail to FAX Mode

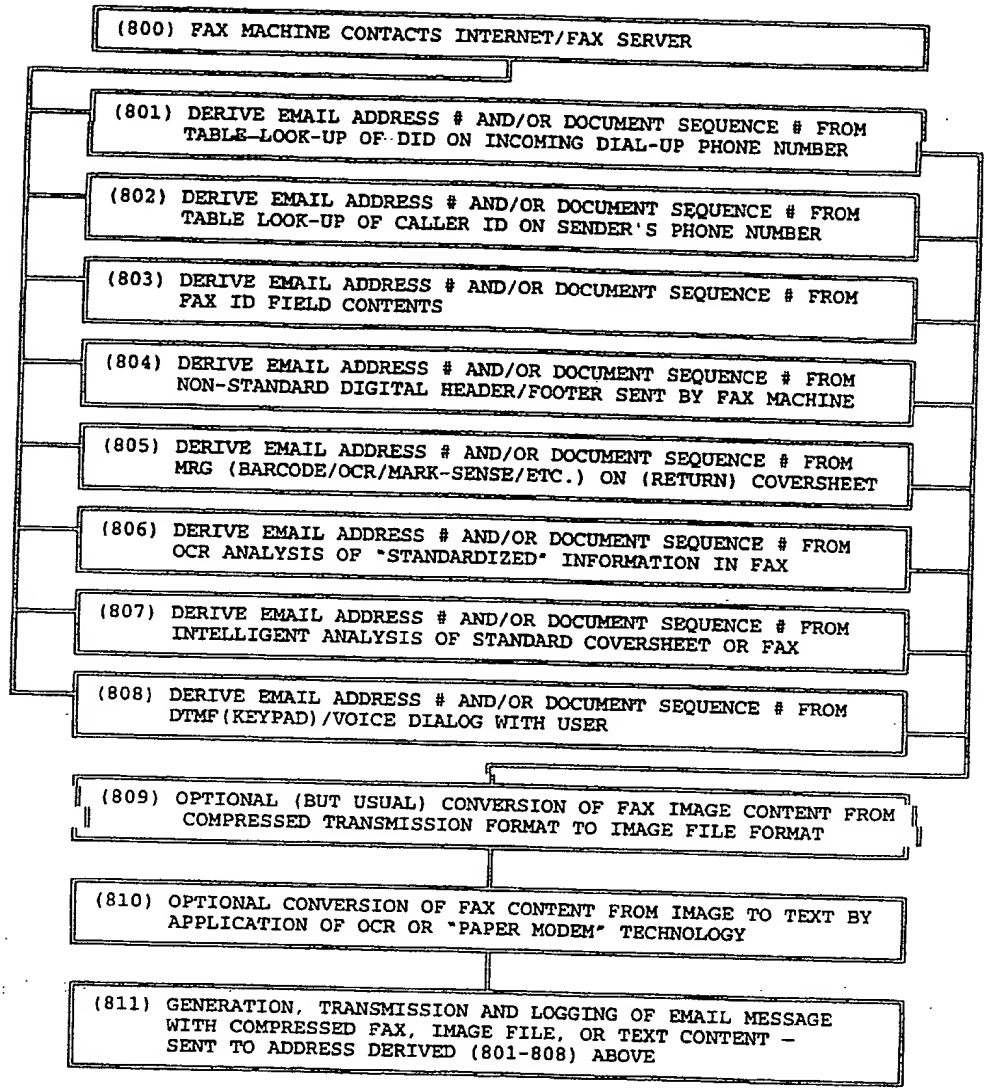


FIGURE 8: Software Flow Diagram of Internet/FAX Server in FAX to Internet EMail Mode

INTERNATIONAL SEARCH REPORT

ernational application No.
PCT/US96/09811

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) : H04N 1/00
US CL :358/402
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 358/402

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 5,247,591 (BARAN) 21 SEPTEMBER 1993, col. 3, line 44 - col.4, line 5.	1, 2, 4 and 6-8
Y	IEEE Transaction on Communications, Volume.COM-29, No. 12, issued December 1981, Teramura et al. "Experimental Facsimile Communication System on Packet Switched Data Network", pages 1942-1951.	3, 9-13, 15 and 16
Y	US, A, 5,416,602 (INGA ET AL) 16 MAY 1995, see digitizer 44 and transmission connector 44.	5
Y	US, A, 5,404,231 (BLOOMFIELD) 04 APRIL 1995, Col. 4, lines 23-26.	17, 18
X	US, A, 5,291,302 (GORDON ET AL) 01 MARCH 1994, see cols 13 and 14.	19 and 20

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be part of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 JULY 1996	18 SEP 1996
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer EDWARD COLES, SR. Telephone No. (703) 305-8576

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/09811

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,207,598 (REICH ET AL) 10 JUNE 1980, see entire document.	1-20
A	US, A, 4,106,060 (CHAPMAN, JR.) 08 AUGUST 1978, see entire document.	1-20
A	US, A, 4,757,348 (ROURKE ET AL) 12 JULY 1988, see entire document.	1-20
A	US, A, 4,748,317 (SATOH) 31 MAY 1988, see entire document.	1-20